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ABSTRACT

Illinois Central College's Development of Operational Reasoning Skills (DOORS) project, which is based on Piaget's developmental theory and learning cycle strategy, is described. The project provides a multidisciplinary freshman core program focusing on the improvement of student reasoning abilities. For each of the six DOORS courses--English, mathematics, physics, history, sociology, and social science--several major thinking skills were identified, and all the classes emphasize the same skill at the same time in the semester. Pretesting and posttesting of students to assess changes in cognitive skills and other defined parameters were undertaken. The initial assessment was based on collected high school grade point averages, graduating class rank, and reported American College Testing Program scores. Using a test developed to assess cognitives skills, evidence was found that DOORS students were less academically prepared than the typical entering freshman at ICC. To evaluate the success of the DOORS program in altering the normal attrition of students from college during their first semester, comparisons were made of grades and attrition frequencies for specific courses. Despite several problems in the evaluation process, the results seem to suggest that DOORS students make as much intellectual progress as a typical group of community college students, and do so with significantly lower attrition. The program has allowed six instructors the opportunity to investigate thoroughly the use of experiential learning techniques. Student evaluation of the program was undertaken by administration of a questionnaire and through written descriptions of student impressions, some of which are appended. (SW)

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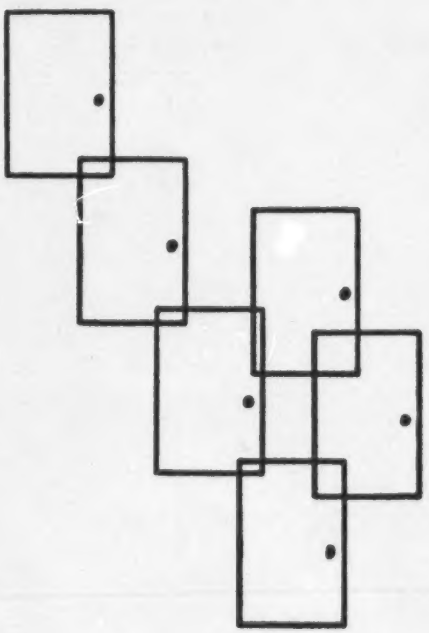

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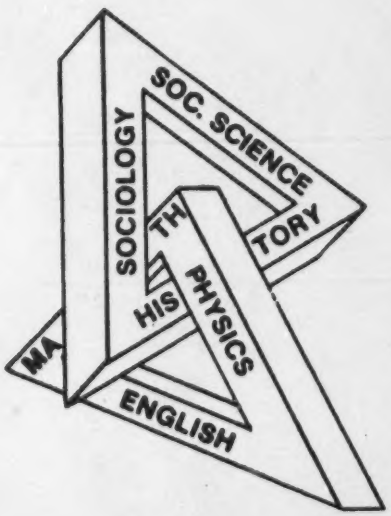

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CONTENTS

I. The DOORS Project in Perspective 1

II. Data Analysis from the Project 4
A. Gross Student Profiles of Community College Students 5
B. Cognitive Assessment 6
C. Attrition Frequency Analysis 6
D. Student Evaluation of the DOORS Program. 8

III. DOORS as a Model for Curriculum Development. 11

IV. DOORS as a Model for Faculty Development 12

V. Impact of the DOORS Project. 15

VI. Summary and Conclusions. 16

Appendicies

I. The Learning Cycle Model

II. Statements from DOORS' Faculty Members

III. The Forum for Liberal Education

I. The DOORS Project in Perspective

The two year DOORS project at Illinois Central College has addressed a basic issue in high education: low level student reasoning abilities. As stated in the original project proposal, the major objective of the project was to:

> .....develop and teach a multidisciplinary freshman program at Illinois Central College. This program will focus upon the improvement of student reasoning skills.

Recent research dealing with the low level of student reasoning via Piaget's Model of Intellectual Development shows that as many as 50% of incoming freshmen are concrete operational thinkers.

The problems resulting from the low level of student reasoning are varied. They include inefficient remedial programs, high class attrition frequency, and low academic success. This project addressed these problems by creating a new core academic program for freshmen at ICC. The essential features of this new core program were aimed at developing student reasoning abilities. These features included experimental based learning activities, integrated class content, stress on participation/attendance, and emphasis on process rather than content attainment.

At the center of the DOORS effort has been the psychology of Jean Piaget. His work with children of all ages has resulted in the documentation of a developmental model of intellectual growth. With the help of ADAPT (Accent of the Development of Abstract Processes of Thought) at the University of Nebraska, Piaget's model was utilized extensively in developing all classroom materials for use in the DOORS classes.

Piaget's developmental theory of intelligence offers a unique approach to the problems associated with low cognitive functioning. In a "nutshell," his view of intelligence is developmental, progressing through several recognizable stages. Each stage has been shown to be a prerequisite for the next stage. In a recent article, Fuller, Karplus, and Lawson (1977) outlined the prominent characteristics of the final two stages of development, concrete and formal.

<u>In Concrete Reasoning, a person</u>

-needs reference to familar actions, objects and observable properties;
-uses classification, conservation, serial ordering and one-to-one correspondence in relation to concrete items above;
-needs step-by-step instructions in a lengthy procedure, and
-is not aware of his own reasoning inconsistencies among various statements of contradictions with other known facts.

<u>In Formal Reasoning, a person</u>

-can reason with concepts, relationships, abstract properties, axioms and theories;
-uses symbols to express ideas;
-applies combinatorial, classification, conservation, serial ordering and proportional reasoning in these abstract modes of thought;

-can plan a lengthy procedure to attain given overall goals and resources; and
-is aware of and critical of his own reasoning, and actively checks on validity of his conclusions by appealing to other information.

Since the mid-1960's, Piagetian studies of cognitive thinking strategies have consistently found less than half of all entering college freshmen operate at a formal reasoning level. Comparable assessment of community college students suggests that fewer than 30% are formal in the use of proportional reasoning. The problem, from this unique viewpoint, is a basic one--most beginning college students, who are expected to be capable of abstract thought, either operate at the concrete level of reasoning or do not consistently evoke and use formal thinking strategies consistently.

The essence of Piaget's work is rather complex for the average faculty member to understand and adapt to his teaching. Therefore, a paradigm derived from Piaget's work by Karplus (1968) called the Learning Cycle was adopted for use. All DOORS staff members were introduced to the essential features of Piaget's model and the Learning Cycle through intensive workshops at the University of Nebraska at Lincoln in August of 1976. A more in-depth discussion of the Learning Cycle is presented in Appendix I.

During the fall semester of 1976, the DOORS staff (six teaching faculty and director of counseling) met together in a weekly seminar to discuss both the scope and direction of the DOORS project. Although the project was to be patterned after the ADAPT program in Nebraska, the needs of community college students were perceived to be much different. Whereas the Nebraska program required all ADAPT students to enroll entirely in the program for an entire year, the DOORS faculty felt this model would not suit the target DOORS population.

After considerable discussion it was decided that the program would be one semester in length and students would be required to enroll in both DOORS English and DOORS Mathematics and then select at least two additional DOORS courses from the following choices: economics, sociology, history, and physics. The predicted target population for this program had the following characteristics:

1. Beginning students with undefined career goals.
2. Beginning students with average to just below average high school academic records/classwork.
3. Older, returning students who are beginning their college careers.

The weekly seminars proved to be very productive. At each session, individual staff members discussed their specific learning cycle plans. As these were presented, other faculty would respond with constructive criticism. The result was two-fold. First, participating faculty felt pressure to continue to develop curriculum materials which were parallel with Piaget's model. Second, an interpretation of the content (each knowing what the other had planned) and reasoning required for each classroom experience was a natural occurrence. Through much interaction, a rearrangement of the order of topic presentation by each staff member produced a cohesive curriculum.

In January of 1977, the first DOORS program was offered to ICC students. Some difficulties were encountered in offering this program at the beginning of the second semester--most of the courses were first semester courses, designed for beginning students. Not many new freshmen are available; however, 32 students entered the program--14 qualified as full time DOORS students and completed both the pretest and posttest evaluation instruments.

During the summer of 1977, the DOORS staff again utilized the seminar method to review and revise their curriculum materials. Through our experience we realized that our efforts were not appropriate at integrating the DOORS content to make the program "interdisciplinary." In reviewing our experience we realized that the program was really "inter-skill" and should be integrated through the parallel use or emphasis on reasoning skills. Again a thorough review of our materials revealed this to be a most satisfactory method for interrelating the various disciplines.

To expedite this reorganization, the DOORS staff identified several major thinking skills basic to the six disciplines. As this task was completed, these skills were arranged in a natural ascending order. Each of the DOORS classes was then redesigned to emphasize these common thinking skills concurrently. Thus, all the DOORS classes emphasize the same skill at the same time in the semester. A brief outline showing this skill identification and emphasis schedule for the first seven weeks of the semester is shown below.

Reasoning Skill Identification

Week	English, History, Sociology	Math, Economics, Physics
1.	Observation (Identification of variables)	Observation (Identification of variables)
2.	Description (Describing variables)	Description (Describing variables)
3.	Comparing or Relating (comparison and contrast)	Comparing or Relating (graphing)
4.	Comparing or Relating (comparison and contrast)	Inferring (graphing)
5.	Classification	Classification
6.	Classification	Separation and Control of variables
7.	Summary	Hypothesis Statement
8.	Cause and Effect	Separation and Control of variables
9.-15.	More Advanced use of Skills	More Advanced use of Skills

In the fall of 1977, the second DOORS program was offered to 32 students. During the semester, a careful monitoring of each course and the reasoning abilities utilized was conducted. New topics were introduced via these selected skills allowing DOORS students to utilize them in at least three classes simultaneously.

During the spring, summer, and fall of 1978, longitudinal data for the two DOORS student populations were studied.

II. Data Analysis from the Project

At the beginning and end of each DOORS offering, students were pretested and posttested to assess changes in cognitive skills and other defined parameters. A good controlled evaluation of the program's effectiveness was difficult for two reasons. First, since students entering the DOORS program self-selected to enter the program, it was difficult to obtain a suitable control group for comparison. Initially, our approach was to select a control group from the total "transfer population" at random and ask them to participate in an evaluation study. But we realized the academic profile of DOORS students would most likely be different from the random group selected. Therefore, we approached the problem by selecting individual classes where students with academic parameters similar to the DOORS group could be found. Then we matched these students with the DOORS group using definable characteristics. This procedure has met with limited success.

The second problem in evaluation is the lack of a standard assessment instrument for evaluating cognitive abilities. In this respect, we have shared our concern with other colleges attempting similar programs: (ADAPT - University of Nebraska at Lincoln; STAR - Metropolitan State, Denver; SOAR - Xavier University, New Orleans; and the Cognitive Program Essex County College, Newark, New Jersey). As a result of our cooperation, many of these colleges are giving the same pre-post evaluation instruments. This will allow us to make some statements about the effect of experiential, process oriented program and about the relative skill development of students at various colleges in the greater midwest.

The evaluative conferences supported through the DOORS grant have had considerable influence on our approach to evaluation. This group of colleges has attempted to combine their expertise to develop and use a written instrument for assessing cognitive abilities. Although the instrument is far from being perfected, it represents one of the leading attempts to develop such a testing item and has been sought by many researchers in the field of cognitive development.

Specifically, the newest version of the test contains 7 sub parts. These components of the test were designed to measure students' abilities in six primary reasoning areas:

Test Component Part	Reasoning Area-Assessed
1. Metric Distance	Proportional Reasoning
2. Chemicals	Combinatorial Logic
3. Flexibility of Rods	Hypothesis Formation
4. The Analogies	Spatical Relations
5. Mice	Correlations
6. Abstractions	Exclusion of Irrelevant Variables
7. Coin Toss	Probabilistic Reasoning

A. Gross Student Profiles of Community College Students

The initial assessment conducted in the project was based upon collected high school grade point averages, graduating class rank, and reported ACT scores. Even this collection was difficult since ICC does not require students to file any of these statistics for admission. Using available data (approximately 50% of the control groups and 30% of the DOORS students reported ACT scores) a comparison shows that typical community college students (N=832 entering full-time freshman students) are approximately the same as a population based on the national average. However, DOORS students were significantly below this average.

In other preliminary assessment, the cognitive pretest was used to determine students' reasoning abilities. The results of this preliminary analysis is shown in Table 1.

	Total N	% Formal	% Transitional	% Concrete
DOORS (Spring, 1977)	28	10	40	50
Control (Spring, 1977)	30	26	67	7
DOORS (Fall, 1977)	36	6	41	53
Control (Fall, 1977)	34	12	76	12

TABLE 1. Percentages of Formal, Transitional, and Concrete Students Found in Control and Experimental Groups as Determined by Pretest Analysis.

These data suggest that regular community college students (control) have difficulty with formal thought but usually 90% are at least transitional in their thinking. The students attracted into the DOORS program have even more difficulty with abstract thought, with only 6-10% using formal thinking strategies consistently.

B. Cognitive Assessment

Next, an analysis of cognitive growth was undertaken using the cognitive test in a pre-post format.

Although the DOORS students are at a marked disadvantage on the pretest, both groups do gain significantly in thinking skills during the course of the semester. In two sub-parts of the instrument, the interaction between the groups and the time is significant. This indicates that the control group improved significantly more during the semester than the DOORS students.

One could speculate about why both the DOORS group and the control group made significant progress from the pretest to the posttest. Here again we see that the first semester of college is a time of academic growth and intellectual development. On the average, students in the control group were more academically prepared than students in the DOORS group. Reported ACT scores (composite) were 20.7 and 17.7 respectively for the controls and for DOORS. In addition, the GPA's attained during this first semester were very different: 2.5 for the control group and 2.1 for the DOORS group. These data suggest the DOORS students should be considered to be less academically prepared than the typical entering freshmen at ICC. This was intended to be the target population and the program seems to be providing them an environment for advancing their reasoning abilities.

C. Attrition Frequency Analysis

To evaluate the success of the DOORS program in altering the normal attrition of students from college during their first semester, several comparisons were made. First, Table 2 shows a composite of the semester results from the fall of 1977. To evaluate attrition, grades of F(Fail), I(Incomplete), and W(Withdraw) were reported for several college groups. The successful column shows the percentage of passing grades received by students in these academic areas. The unsuccessful column shows the total percentage of F, I, or W grades in each category.

Identified Group	F	I	W	% Successful	GPA	% Unsuccessful
Liberal Arts & Sciences	(1421) 13.6%	(705) 6.8%	(1366) 13.1%	66.5%	2.45	33.5%
Business	(783) 11.5%	(209) 3.1%	(898) 13.2%	72.2%	2.54	27.8%
Health, Math & Science	(470) 9.5%	(123) 2.5%	(701) 14.2%	73.8%	2.49	26.2%
Control Group	(3167) 12.0%	(1191) 4.5%	(3434) 13.0%	70.5%	2.50	29.5%
DOORS Group	(9) 6.4%	(2) 1.4%	(15) 10.7%	82.9%	2.10	18.5%

TABLE 2. Summary of Attrition Frequency for the College and for Selected Subpopulation for the Fall Semester of 1977. Attrition is based upon the frequency

This may be the most compelling data collected in favor of the DOORS project. Whereas the rate of unsuccessful completion in the college transfer program ranges from a high of 33.5% to a low of 26.2%, the DOORS group, who are less capable academically, had an attrition rate of only 18.5%.

To look more closely at this phenomena, data were compiled on attrition frequencies from specific college courses like the DOORS courses. Table 3 shows the frequency of F, I, and W grades for each of the six DOORS courses, contrasted with other traditionally-taught college courses. The selected courses were either the same courses (when possible), or a companion course of similar discipline and entry level.

Discipline	Courses	F	I	W	GPA	Tot.Successful
English	English 110 (34 sections)	118 (13.7%)	36 (4%)	97 (10.8%)	2.45	71.4%
	DOORS English	3 (8.8%)	1 (2.9%)	1 (2.9%)	2.03	85.3%
Math	Mathematics 110 (6 sections)	19 (10.6%)	8 (4.4%)	21 (11.7%)	2.27	73.3%
	DOORS Mathematics	2 (6.3%)	0 (0%)	10 (31.3%)	1.73	62.4%
Economics	Economics 110 (5 sections)	35 (19.1%)	1 (.5%)	23 (12.8%)	1.94	67.6%
	DOORS Economics	1 (6%)	0 (0%)	2 (11.0%)	1.50	83.0%
History	History III (2 sections)	3 (7.0%)	2 (4.7%)	8 (18.6%)	2.5	69.7%
	DOORS History	1 (5.3%)	0 (0%)	0 (0%)	2.84	94.7%
Physics	Phys.Science III (3 sections)	18 (12.1%)	0 (0%)	22 (14.8%)	2.23	73.1%
	DOORS Physics	1 (7.1%)	0 (0%)	2 (14.3%)	2.25	78.6%

TABLE 3. Attrition Frequency Comparison of DOORS Courses with Composite of Other Courses for the Fall Semester of 1977.

These data suggest that individual DOORS courses are providing learning experience for enrolled students which helps them achieve success. The only comparison which negates this hypothesis is the data for mathematics. Part of this problem has already been recognized and corrected. During the fall semester, the DOORS students were required to take mathematics. This resulted in a very wide-spread in abilities (even greater than usual). To ease some instructional problems which resulted, the DOORS director counseled with four of the DOORS math students. These students were allowed to move into a lower preparatory course and therefore appear as withdrawals in Table 3. This accounts for 12.5% of the attrition frequency of DOORS math and was probably due in part to ineffective screening during registration. To prevent this problem the DOORS program has offered DOORS math as an elective in the program. In addition, a prerequisite will be assigned to DOORS math: students must have passed a course in high school algebra with a grade of C or above. These changes have increased the successful rate for DOORS math to 78.6% in the Fall of 1978 (DOORS 3).

As the DOORS project continues, preliminary data collected on DOORS 3, fall of 1978, indicates this attrition reduction has continued. Totals for the 1978 fall program (including 7 classes) demonstrate a successful rate of 90.6% - only 9.4% were unsuccessful and received a F, I, or W grade. Another positive feature is the increase in the DOORS students' GPA. Whereas, the GPA for the group was 2.10 for the fall of 1977, in the fall of 1978, it has increased to 2.58 which was significantly higher than the control group.

Analysis of GPA brings up another interesting statistic. Skeptics may claim that reduced attrition frequency simply reflects lower grading standards found in DOORS classes. Thus, students who feel they will achieve higher grades stay with the program longer and achieve higher grades than they would in regular college courses. To investigate this claim, each DOORS student from the fall of 1977 who remained at ICC to take traditional classes during the spring semester (79%) was followed to determine changes in GPA. This study revealed that these former DOORS students on the average made exactly the same GPA (2.1) as they had in the program.

D. Student Evaluation of the DOORS Program

Near the end of the fall semester, student evaluation of the DOORS program was completed in two ways. First, a questionnaire consisting of forced answer and open-ended questions about the semester of work just completed was given to both the experimental and the control students. Second, each DOORS student was asked to write an open paragraph about his impressions of the classes attended during the semester.

Illinois Central College
The DOORS Program

Illinois Central College has been concerned that many entering community college students have a low level of reasoning abilities. In many instances, these students are required to participate in ineffective remedial programs, are ineffective learners in traditional courses, and are responsible for high rates of college attrition.

The Development of Operational Reasoning Skills (DOORS) program provides a multidisciplinary freshman core program focusing on the improvement of student reasoning abilities. The classroom intervention model is based upon Jean Piaget's theory of intellectual development. Thus each of the six DOORS courses—English, mathematics, physics, history, sociology and social science—uses the Piagetian strategy of the Learning Cycle. The first phase is exploration, in which students recall and share past concrete experiences and assimilate new experiences. The invention phase involves generalization from these concrete experiences toward broad concepts or principles, which are then used in other settings in the application phase. This Learning Cycle encourages students to think independently, guided by faculty members acting in a director or facilitator role.

The DOORS program began offering courses in the spring of 1977 to 32 entering students at Illinois Central. The program is designed to provide an alternative way of fulfilling general education requirements, especially for students who are unsure of their career goals, who are returning to college some time after high school graduation, or who demonstrate high ability but low grades. Students in the program are required to take three DOORS courses in their first semester; some take as many as five while others enroll in regular courses in the college.

The six DOORS courses are taught in the regular departments of the college, with the linkage among them coming not from content but from skills. During the development of DOORS materials, the project staff identified several major thinking skills basic to all six subject areas and arranged them in natural ascending order. DOORS classes were then reorganized so that all courses emphasize the same basic reasoning skill in a different context at approximately the same point in the semester. For example, all classes begin with observation and description. The history class began with the college itself; the English class started with oral explanations of geometric shapes. Physics students measured the mass, volume, and density of various objects. From such simple concrete exercises the curriculum moves to more abstract reasoning skills such as comparison and contrast, classification, inference, and cause and effect. Student learning is reinforced by the repetition of reasoning skills in the contexts of several disciplines.

Evaluation of the DOORS project has been hampered by the difficulty of selecting a matched control group and by the absence of adequate instruments to test the skills the program tries to foster. Given these limitations, however, DOORS has undertaken a substantial evaluation effort. Comparison of DOORS students with a control group of Illinois Central freshman on a number of measures demonstrated that the program did indeed bring about significant improvement. Pretest-posttest comparisons on cognitive instruments showed 86 percent of the DOORS students making upward progress; 50 percent of the control group also improved while 10 percent made no change. In interviews and questionnaires, students responded with favorable comments about the program, with some of them noting specifically their improved reasoning abilities.

The DOORS program has also influenced the faculty members involved. The goals of this program require radical departures from traditional teaching methods, forcing instructors to redesign their course offerings. In the development phase, under a grant from the Fund for the Improvement of Postsecondary Education, DOORS staff met together weekly to teach their new courses to one another. Each instructor became familiar with the material presented in other classes, received assistance in revision of courses, and learned of student reactions across disciplines to the objectives of the program. Some faculty have made substantial revisions, not only in their DOORS courses but in the other classes they teach as well. In addition, one new faculty member has joined the program; the DOORS staff hopes that others at the college will use these approaches in other offerings.

DOORS has developed a formal cooperative agreement for evaluation with other cognitive-based programs at Metropolitan State College in Denver, The University of Nebraska-Lincoln and Essex County College in Newark. In addition, the staff has visited a number of other institutions to share the philosophy and experience of the DOORS program, and to encourage others to devise general education programs appropriate for students with low reasoning skills.

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1. Evaluation Questionnaire

This questionnaire was adapted from a variety of questions which ask for general reactions from students concerning their experiences in the college semester just completed. The questionnaire was subdivided into several categories including "Enjoyment of Studies," "Instructor Rating," and perception of "Skills Learned." The results are shown in Table 4.

Group	N	"Enjoyment of Studies"	"Instructor Rating"	"Skills Learned"
DOORS Students	32	6.0	30.3	4.2
Selected Control Students	34	5.3	28.3	3.0

TABLE 4. Summary of Results from Evaluation Questionnaire.

These results suggest that DOORS students enjoyed their studies slightly more than the students in the Control groups (6.0 out of a a possible 8.0), but rated both their instructors and the acquisition of basis skills much higher. Again, DOORS students indicate these perceived changes during the semester are important justifications for the program.

On an open-ended question on the evaluation, students were asked to "...Please describe in the space below the ways that you learn best, particularly those that may be unique to you." In summarizing the results, students in the traditionally-instructed control class keyed on things like "Taking good notes in class--taking notes from books," "Study hard on material and just review," etc. The DOORS group, on the other hand, mentioned a very contrasting list of things: "Through teachers taking the time to carefully explain," "Through experimenting with other students," "Class discussions," "By figuring things out for myself," "On my own through research and asking," "Through problem-solving activities," etc. DOORS' students chose a more humanistic and probing approach to learning, although they probably at one time have utilized each of the techniques mentioned by the control students.

2. Students Descriptions of the DOORS Program

Near the end of the 1977 Fall semester, students in the DOORS program were asked to write a paragraph expressing their perceptions of the classes they were attending. Students were asked to be honest and to write as if they were describing the program to a new student who was interested in enrolling in the program.

The paragraphs illustrate the very positive student view of the program. In summarizing the comments made by these students, four repeated views can be found below.

a. Unlike traditional classes, the DOORS program provides a more meaningful classroom atmosphere where students are allowed to actively participate.

"The difference between a DOORS class and a conventional class is like the difference between participating in a football game and sitting at the top row of bleachers in the stadium. The student's role in a regular class is mainly to be a spectator at a lecture session, while in a DOORS class he becomes an explorer and participant in rediscovery."

"In my experience, nearly all of the classes provide a new and different way of learning. There are more group sessions, more student participation, and a better student to teacher relationship than in the conventional way of teaching."

b. Since DOORS students are enrolled in most of the DOORS classes, students get to know one another better.

"After the first week or so, I got to know most of my classmates pretty well. This proved to be an advantage because I felt more free to ask for their help and opinions."

"In the average college schedule you seldom have classes with the same people, but in DOORS you are in different classes with the same people. As a result of this, friendships form that may last a lifetime."

"Getting to know everyone puts the classroom atmosphere at ease, and everyone is willing to listen to others' opinions..."

c. The integration of the DOORS classes and the stress on reasoning make learning more meaningful and longer-lasting.

"All in all the intermingling of subject matter along with fresh, new, and logical instruction makes the DOORS program an experience which should enrich the lives of students in and out of the classroom."

"Another advantage of the DOORS program is that individual classes are designed to fit together, and the knowledge gained in one class can be simultaneously applied in another."

d. All of the DOORS students recommend DOORS to new students.

"DOORS is something every freshman should get into. It gives the student a better insight into college and lets him discover new ways of learning and developing his reasoning skills. It has helped me in getting to know the students as well as the instructors and has given me a better insight into college."

"I feel that DOORS courses are good to take as incoming freshmen. They help you get off to a good start in your first year at Illinois Central College."

"I think anyone having this program for a semester will find regular college classes easier."

"Overall, I believe that the DOORS program is a success. It is beneficial to the incoming freshmen as well as the older student. For the student who wants to learn but can't decide on a major, this program will open doors."

"The DOORS program will provide you the once-in-a-life-time opportunity to start off on the right foot at the very beginning of your college career, and it will secure for you the foundation you will need in your future course of study."

III. DOORS as a Model for Curriculum Development

The status of change in American Higher Education is a concern of many. The back-to-the-basics movement threatens much of what we have learned about education psychology and learning theory. In a recent article for The Forum for Liberal Education, (November, 1978), Theodore Lockwood (President of Trinity College, Hartford, Connecticut) discusses the general education movement in America.

> The current trend at colleges of reviving distribution requirements does not convince me we are improving the quality of education. Giving the curriculum more structure doesn't necessarily give it coherence. I am skeptical that meaningful educational reform can occur if it is not based on a new philosophy of education and shared assumptions by faculty members of what education should be in the last quarter of the twentieth century.

Later he goes on to state that:

> The desire to strengthen the liberal arts is an essential preoccupation of educators. However, in the absence of shared assumptions about what is important, curricular reform will result in little more than tinkering or it will degenerate into a process of academic log-rolling, with each discipline guided more by the desire to maintain or increase enrollments than by any educational ideal.
>
> I am troubled by the absence of faculty initiative in much of the present curricular reform. They may, at the prompting of the administration, work out a different approach to, or a re-ordering of, the curriculum, but...few...clearly articulated and shared philosophy of faculty members...

Whereas we agree that this view may represent the general trend in reform of general education, such as assessment does not fit the DOORS Project.

The DOORS staff whole-heartily agree that much of educational reform suffers from a lack of basic agreement by faculty on new philosophical approaches. But this is exactly the DOORS project strong suit - a deep running thread of basic conviction by the faculty that most traditional education stagnates the cultivation of students'thinking abilities. It is upon this foundation that a new core curriculum can be truly integrated across discipline lines. The DOORS faculty have agreed that thinking patterns and their development are basic and

prerequisite to most course content. Therefore, the constant reflection on these basic skills can produce a series of learning environments which allow students to explore their thinking capacity in each of several disciplines simultaneously.

We also share Lockwood's fear for "lack of faculty initiative in much of curriculum reform." But again, DOORS exemplifies an alternate pattern because the program is 100% faculty initiated, directed, and promoted. Actually, the program has grown and survives with the traditional curriculum without an active administrative directoriate.

Through our experience, we think we have learned how the modern curriculum should be integrated. This cannot be accomplished around thematic designs or forced general relationships. We propose that basic thinking skills (as defined by Piaget and others) are fundamental to every discipline and offer the most practical answer to the call for "back-to-the-basics." We are further convinced that this model answers the primary questions which Lockhead raises at the close of his article..."Can we reach agreement on priorities? Once we articulate our convictions can we reach a consensus that enables us to carry out genuine reform?" Let us hope it will not be another decade (or longer) before higher education can agree upon some fundamental purpose for curriculum reform. The DOORS model could perhaps be the model for creating this atmosphere of basic agreement.

IV. DOORS as a Model for Faculty Development

As educational institutions have attempted to respond to the demographic and education needs of their student bodies, faculty mobility has been markedly reduced. With the threat of continued decline in enrollments during the 1980's, schools in higher education have continued to enroll an increasing number of academically less qualified students as well as more adults. Each of these groups has special education needs. Neither educational programs nor faculty has responded to quickly meet the needs of these diverse groups.

At the same time, a phenomena known as the "knowledge explosion" has placed an enormous strain on the question of .."what do we teach?" Faculty are unable to coordinate learning experiences which are basic to all knowledge. As a result, attempts to coordinate cooperative efforts in curriculum development have been met with resistance and cries of "encroachment" on academic freedom.

To complicate things even more, faculty are less mobile, less able to move within an institution or between institutions. Schools are faced with the realization that during the 1980's as many as 90% of their faculty will receive tenure, and 10 years from now the faculty will be, for all practical purposes, the same faculty they have now, and from this group, educational change must be initiated.

Illinois Central College is a reflection of the description given above. Since its conception in the Fall of 1967, only 25% of the original 75 faculty are still on the staff. Today, 90% of its academic staff are on tenure - in some more traditional departments (e.g., mathematics and science) this figure soars to 97%. It is within this climate that the DOORS project was initiated (by faculty) and has produced significant changes in a small number of faculty. Although the individual ingredients which lead to change in faculty attitude are complicated, we believe that the basic model of DOORS will work in other settings.

As Lockwood (Forum for Liberal Education, 1979) points out, a basic agreement on the philosophy of education and shared assumptions on the requirements for change are extremely important to curriculum change. The Piagetian model provides this basic framework: reasoning abilities underlie all content disciplines and thus provide the essential unifying feature.

Faculty members were selected to participate in the DOORS project by their past teaching record. Since its beginning, ICC had rewarded faculty for being excellent lecturers-thus the DOORS faculty were expert teachers who had received many years of reinforcement for their lecture style of teaching. The DOORS project was to be a drastic departure from this "student passive" system to allow a great deal more student freedom and less teacher dominance.

The project began with an intensive two-day workshop on Teaching and the Development of Teaching led by the ADAPT faculty. This workshop introduced the DOORS staff to the basic ideas of Piaget and how his work can be applied to college teaching. The workshop is non-passive and requires much participation, thus using the education philosophy of Piaget to introduce the faculty to Piaget.

The reaction of the DOORS staff was mixed. Some were more enthusiastic about the project; one in particular was very frustrated-not seeming to understand what was happening.

After returning to ICC, the staff began to work together in a seminar format. After much discussion over the required reduction of content coverage to allow for increased classroom activity, we began the long process of materials development. Thus several precursory conditions were fulfilled:

1. Each of the staff had made a definite committment to join the project, and develop and teach a selected course.

2. Each staff person had agreed to attend a weekly staff seminar. His responsibilities would be two-fold; first, to present his classroom plans, and second, to make objective comments/suggestions concerning the plans of other staff members.

The climate created by this atmosphere was most productive. Basic issues were raised and discussed. Some disagreements surfaced but were eventually resolved by mutual consent. The faculty growth was greatly aided by the multidisciplinary aspects of the project. As we viewed what was occurring, we found that faculty outside of our own discipline were excellent reviewers of plans made for teaching our classes.

In reviewing our classroom materials, we found a natural cohesive thread: the basic thinking abilities which we were emphasizing. This discovery added to the faculty's determination and confidence, in the teaching done by the staff in their traditional classes (outside the DOORS classes). Some were using the DOORS approach rather than lecturing.

My own analysis of the change which can occur in faculty during the initiation of a project for curriculum is outlined below. There are essentially four, non-equal, steps which faculty take when involved in a DOORS type project.

Step 1 (Small). Participating faculty must agree to take part; attend meeting, write materials, etc.

Step 2 (Medium Step). Faculty must agree to place less and less emphasis on their lecture and allow for more activity on the part of students. With this comes an agreement that some content "coverage" will be necessary but this will be compensated for by the longer-lasting learning produced by participating students.

Step 3 (Giant Step). At this level faculty recognize that a non-traditional classroom approach will produce a different type of student learning. Thus a non-traditional evaluative method must be used to follow student progress.

Step 4 (At The Top). Faculty are convinced that experiencial learning is important for all learning regardless of age or ability. Thus they begin using the new approach in all their classes, not just those taught within the special project.

At the end of the DOORS project, the current DOORS faculty were asked to write a short account of their DOORS experience as it related to them as a teacher. These are displayed in Appendix II. From these statements and from other evidence I have observed, the seven DOORS faculty are now distributed in the following manner: Step 1 (2), Step 2 (1), Step 3 (0), and Step 4 (4). These data show that the model is not full proof-it can't work for all faculty. But for over half of the staff, a rather significant, long-lasting impact has resulted.

V. Impact of The DOORS Project

During the 2 1/2 years since the project began at Illinois Central College, word of its existence and unique nature has been moderate but consistent. On the local scale, through numerous newspaper articles, radio talk shows, and brochures, the public has been informed. On a regional or national scale, reference has been made to the DOORS project in two major magazine articles and a feature story in The Forum for Liberal Education Newsletter (Appendix III). What specifically has happened as a result of these efforts?

A. Local Impact

Illinois Central College has a rather traditional college transfer program which lacks from much real innovation. The DOORS project, in our estimation, has been one of the only significant attempts at providing a real option to beginning college students. In this climate, a new and different approach is viewed with some degree of challenge by traditional instructors and administrators. On the other hand, those who were eager enough to learn about what the project was attempting to do were impressed with the effort. Local workshops for ICC faculty suffered from low attendance and most local department chairmen were uncertain as to what we were attempting. The one most consistent misconception about our program was..."it's developmental-therefore, it must be remedial and designed for the weakest students!"

Through discussions with local counselors and interested faculty, some of these misunderstandings have been dispelled but many faculty remain unconvinced. Currently, the DOORS faculty are recruiting new faculty to participate in our program and by the Fall of 1979 we have reason to believe that two new courses, developed by other faculty, will be added. We agree that this willingness to participate is meager at best, but gratifying from the standpoint that..."it's hardest to be recognized among your academic PEERS."

B. Regional and National Impact

In many respects, the DOORS faculty feel that our biggest impact has been on the regional scale. During the past year, the DOORS faculty have made numerous workshop presentations, or participated in presentations with the ADAPT group. In each case, the response to our program has been quite positive and many faculty at other postsecondary institutions are now designing or considering the possibility of designing DOORS type programs.

In addition, our mailing list continues to grow each month. It now totals over 250 and requires a constant effort to keep others informed about our efforts.

VI. Summary and Conclusions

The summary of results from the data collected in this project has been somewhat disappointing. Our major objective concerned the enhancement of beginning college students' use of more formal thinking processes. Either through ineffective evaluative efforts, the shortness of the intervention period or due to a host of other uncontrolled variables, this result was not varified. On the other hand, the results do seem to suggest that DOORS students, even though they are as a group much less academically prepared, make as much intellectual growth as a typical group of community college students, and do so with a significantly lower attrition frequency. This conclusion is even more significant in the light of longitudinal evidence showing that the DOORS students are continuing in their pursuit of academic courses with nearly the same frequency as typical students. The exact reasons for these results are not known but here are several hypotheses -

A. The experiential nature of the program has enhanced the motivation and thus the success rate of students who were not as successful in a traditional program which stressed memorization and abstract thought without reference to concrete experience.

B. The intensified social climate augmented by the DOORS method fostered a new awareness in participating students. Meeting classroom situations requiring individual thought, self-examination, and defense of a personal point of view may have encouraged individual self-perception which resulted in increased determination.

C. The unified nature of the program (both in content and in social engagement) may have increased students' confidence. Nearly all DOORS students say that having the same peer group in several of their classes was of great assistance in completing assignments, finding their way around campus, and in making wise academic decisions.

The second, and equally important conclusion relates to faculty change and commitment. The DOORS program has allowed six instructors the opportunity to investigate the use of experiential learning techniques thoroughly. Because of this involvement, a permanent mark has been left on them, some of their peers, many students, and the institution. As skeptics insist on "proof" the project has been successful, we point to the dedication of our faculty and to the enthusiasm of our students. Granted, the statistical proof is not compelling. But to find interdisciplined faculty dedicated to the pursuit of a single educational goal through a unified program which provides a path for below average students to enter postsecondary education - its existance seems justified.

On behalf of the entire DOORS staff, we wish to extend a heartfelt thank-you to all those connected directly or indirectly with the project. Specifically, I wish to thank the ADAPT staff in Nebraska, Dr. Carol Tomlinson Keasey (now at the University of California - Riverside), each and every DOORS student and control student, the many ICC faculty who gave up class time to provide control data for evaluation, to the ICC administration who continue to be supportive in continuing the project, and finally to The Fund, for without their support, the project would not have been possible.

APPENDIX I

THE LEARNING CYCLE MODEL

Piaget (1964) has identified four major factors which he believes relevant to the development of cognitive reasoning abilities. These factors are:

1. Maturation - students must be biologically mature and physically developed and therefore capable of operating physically in their environment.

2. Experience - students past concrete experience and the ability to recall these experiences are critical for further development. Piaget outlines two types of experience: Physical Experience (drawn directly from objects) and Logical-Mathematical Experience (drawn by actions which affect objects).

3. Social Communication - students must be capable of communicating information via written and oral language.

4. Equilibration - for cognitive growth, students must be supplied a situation of cognitive challenge where their existing mental operations are not adequate. The accommodative process (called equilibration) by which the student deals with this new information will result in cognitive growth.

A translation of this Piagetian theory into a workable model for designing learning experience should incorporate each of these factors. When applied to adolescent students, factors one and three are probably not as important as factors two and four. Piaget himself stresses the interdependence of all four factors but suggests factor two and its proper relation to factor four are fundamental to learning and development (Piaget, 1964, p. 178).

For this research problem, the Learning Cycle will be divided into three major segments: exploration, concept,invention and concept application. The following is an overview illustrating the important general characteristics of each phase.

In applying the Piagetian technique to the classroom, a direct change in emphasis occurs: From the teacher (teacher-centered approach) to the student (student-centered approach). This is accomplished by using a learning model (called the Learning Cycle) which has three distinct and separate parts. Each is outlined below.

1. Exploration

Following a brief statement of topic and direction, students are encouraged to learn through their own experience. Activities may be supplied by the instructor which will help the students recall (and share) past concrete experiences or assimilate new concrete experiences helpful for later invention and/or application activities. During this activity the students receive only minimal guidance from their instructor and explore new ideas spontaneously.

Emphasis - Concrete experience.
Focus - Open-ended student activity.
Function - Student experience is joined with appropriate environmental disequilibrium.

2. Concept Invention

In this phase, the concrete experience provided in the exploration is used as the basis for generalizing a concept, for introducing a principle, or for providing an extension of students' skill or reasoning. Student and instructor roles in this activity may vary depending upon the nature of the content. Generally, students should be asked to "invent" part or all of the relationship for themselves with the instructor supplying encouragement and guidance when needed. This procedure allows for students to "self-regulate" and therefore move toward equilibrium with the concepts introduced.

Emphasis - Generalization of concrete experiences to abstract possibilities.
Focus - Student's active involvement with instructor for generalization.
Function - Student self-regulation and equilibration of generalized concepts and/or skills.

3. Concept Application

The application phase of the Learning Cycle allows each student an opportunity to directly apply the concept or skill learned during the invention activity. This activity allows additional time for accommodation required by students needing more time for equilibration. It also provides additional equilibrating experiences for students who have already accommodated the concepts introduced.

Emphasis - Relevant use of generalized concepts and/or skills.
Focus - Directed student activity.
Function - Further equilibration through broadening concrete experiences.

Although the Learning Cycle allows each student the opportunity to think for himself, the instructor must be an ever present "overseer" of the activity, and by providing probing questions, hints, and encouragement keep the activity going. Yet the instructor must guard against over playing his role as director and planner.

APPENDIX II.

DOORS HISTORY
by
Dick Thompson

My experience in the DOORS program at Illinois Central College has certainly affected me as an instructor. I was primarily a lecture-type instructor for the first eighteen (18) years of my teaching career. I tried to interject appropriate examples during the lecture in an attempt to make the subject matter relevant and timely to the student. I felt very comfortable in the classroom because the teaching method I employed seemed to be successful from the standpoint of the students.

The association I have had with the DOORS program over the last couple of years had made me more aware of the necessity to involve the students to a greater extent in the learning that is going on in the classroom. A colleague of mine shared an old Chinese proverb with me a short time ago. The proverb goes as follows--"Tell me and I'll forget. Show me and I may remember. But involve me and I will understand." This proverb sums up exactly what I and the other instructors in the DOORS program have been striving for.

I have become more aware of the need to develop learning activities that will meet the needs of the students and aid them in understanding some basic historical concepts. I have also tried to develop learning activities that will improve certain basic skills that the students will be able to use in, not only history classes, but other classes that they will be taking throughout their college career.

With the exception of my first few years of teaching, I have never worked as hard preparing for classes as I have with my involvement in the DOORS program. A considerable amount of time is spent developing materials, activities and general preparation for classes. Once in the classroom, the air of uncertainty creates another challenge. Open-ended questions, simulation games, etc., establishes a certain feeling of uneasiness because one never knows what the responses or reaction of the students will be. The instructor must be able to adapt to the various conditions that develop. It is precisely because of this challenge and uncertainty, that teaching has become, once more, exciting.

All of this effort has had its dividends. I have been able to give a much fairer evaluation of the student because I get to observe each of them in various capacities other than a listener and a test-taker. I can base my evaluations of the students on something other than mathematical averages. I have also found that class attendance has increased appreciably. In the same token, student withdrawals have declined. As a result, both the students and instructor have become more highly motivated and happier in the classroom. This type of atmosphere can only have beneficial results in the long run.

MY DOORS EXPERIENCE

by

Tom Campbell

During the two years of the DOORS project, I served a dual role-project director and physics instructor. Although these two roles were somewhat independent, I think that the total DOORS experience has helped me, primarily as an instructor, but also as an administrator.

The job of being a good classroom teacher is not easy. The sheer time demand required to do a decent job becomes almost overwhelming after a few years. As six experienced instructors began the project in the summer of 1976, I realize now that each member of the team volunteered to do additional work - over and above what was expected.

The early months were exciting. For the first time in my career, I found a creative and productive nitche within my own environment. Although ICC had been a new and developing institution, the cooperative atmosphere created in those early DOORS seminars was something that had not existed at ICC during its development.

During those seminars, each member of the team was responsible for two things. First, each in turn would explain ideas for lessons being prepared using the Piagetian Model which the project had adopted. Second, each team member was to express ideas concerning the proposed activity (e.g., How does the activity fit with other content area plans?). Although I came into the project with a good knowledge of learning theory and some practical work with experiential teaching and learning, these seminars were a real exciting learning experience.

What specifically did I learn? First, I learned a great deal about history, English, sociology, economics, and mathematics, both content and instruction. Second, I learned that instructors from other disciplines can be very helpful in reflecting on ideas for classroom activities in my disciplines. Since this is a major discovery, let me expand on it.

Instructors in academic disciplines have a broad and formalistic understanding of their field. This understanding has been developed over a period of years through hours of hard and dedicated work. Students, on-the-other-hand, have tunnel vision while trying to study and learn from these knowledgeable instructors. I think that this is part of the problem with the vast majority of undergraduate education. Some refer to it as the problem of the "cognitive match". However, I learned through the DOORS seminars that trained academic persons also have tunnel vision in subjects outside their own teaching specialty. This means that in many respects, an experienced math teacher can look at a proposed English activity and comment on the content appropriateness as a student, yet at the same time, be able to consider the technical aspects as a seasoned teacher. This was a very effective method for development of program materials and for development of faculty sensitivity to content issues.

As for my own teaching, the project has allowed me to develop a unique set of classroom activities for physics instruction. I think that these materials exemplify, through an effort of the active DOORS staff, a serious effort to match students' intellectual abilities and the demands made by learning materials.

MY EXPERIENCE IN DOORS

by

Karl Taylor

Sometime ago you asked me to send you a statement, expressing my feelings about my involvement in the DOORS program. I am happy to say that it is one of the finest experiences I have had in my professional career. Here are my reasons.

First, I believe that the DOORS experience has changed my teaching style. Although I always tended to be an inductive teacher or to present material inductively, the students in my classes played a relatively passive role. Since I have worked in the program, I believe my students are much more active, doing more involved learning on their own. As a result, I believe my classes are much more interesting, lively and worthwhile.

Second, with more knowledge about Piaget's stages through which we all progress, I believe I can understand my students' problems better than previously. As a result, I seem to be able to diagnose and remediate more effectively than in the past.

Finally, perhaps the most important and rewarding part of the experience for me occurred during the first year when all the teachers in the program met weekly to plot out the direction of our work. The exchange of ideas, the give and take of constructive criticism - these were high points in my educational career. I felt colleagues cared enough about what I was doing to challenge me, yet professional enough to offer suggestions when they were needed.

These are some of the reasons why DOORS has meant so much to me.

DOORS TEACHING

by

Phil McGill

For the past few years, I have been involved in the DOORS project as the mathematics instructor. During this time my attitude toward teaching and students has changed considerably. I have always felt the key to learning mathematics was the establishment of good problem solving techniques. All of the research verifies this conclusion. The major difficulty has been developing these problem solving strategies in the students. My colleagues in the DOORS project have given me some insight into Piaget theories.

Having some understanding of these stages has helped me develop materials to guide the students in learning mathematics. I think, primarily, I am now able to help the students develop problem solving techniques. So I must thank my colleagues for their assistance in this area.

My best teaching mode has been lecture-discussion. I found that this has not changed, but I am much more aware of student involvement in class. Whereas the lecture was the only aspect of my teaching, now I find the discussion as an integral part of each class. I spend more time trying to get the students involved. This student involvement has had its rewards. In particular, the students attitude about mathematics has improved. This in turn has improved with class attendance. When a student attends class and feels that he has something to contribute, his performance changes drastically.

The DOORS project has given me an opportunity to work with outstanding instructors in other disciplines. They have shown me that there is a common denominator in all the disciplines. I feel this interdisciplinary aspect to the DOORS project is what makes it so unique. I have learned alot about teaching from the other members of the DOORS staff. As a result of their help and understanding, I have become a more involved, understanding and compassionate instructor. I have enjoyed the DOORS experience very much.

THOUGHTS ON MY DOORS EXPERIENCE

by

Karen Kay Zucco

Like many other faculty members at Illinois Central College, my initial reactions to the DOORS program were mixed. Although I'd read Piaget, he was only one among many writers all of whom it seemed had devised their own respective theories. When I was first asked about teaching DOORS Sociology, I was ambivalent, partially resultant from my own hesitancy and otherwise resultant from peer skepticism. I decided to do so primarily because I was not satisfied with the performance level of my introductory (nor my intermediate) level Sociology students who were being taught via traditional methods, and secondarily because I felt it would offer a challenge to me.

Developing the DOORS Sociology class was indeed a challenge. In an introductory, transfer level class, terminology and theory are important (my traditional self speaking) as those students who elect to take intermediate level sociology classes would be expected to "know" these basics. Although I agreed heartily that reasoning skills were equally as important I wanted to be confident that the DOORS students did have a grasp on"the basics" by the semester's end. The challenge: to develop learning activities which would satisfy both of my concerns.

My fears regarding the "content" concern were quickly dissipated, for I found that throughout the first semester, my DOORS students performed as well as if not better than my traditional students on the same examinations (I have always attempted to use examinations requiring thought, analysis, and application of facts as well as recall). I also found my DOORS students to be much more active in and enthusiastic about class than my traditional students, and consequently, I was personally able to "relax" and enjoy the class.

Two semesters of experience with DOORS Sociology have altered my attitudes towards teaching and learning significantly. I find myself applying elements of the Piagetian theory to even my most "traditional" classes. I have actually developed learning cycles for other sociology classes and have elected to teach classes which are by design experientially oriented. Today I am convinced of the value and benefits of the Piagetian model for community college teaching, and although I have always enjoyed teaching, I personally find the use of this model not only more challenging but also much more rewarding as I observe the student's response and intellectual growth.

APPENDIX III.

The Forum for Liberal Education

forum

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Kathryn Mohrman, *Editor*
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A Skeptical Look at the General Education Movement
Theodore D. Lockwood . . . 1

Brigham Young University 3

North Texas State University . . . 4

St. Anselm's College 5

Bowdoin College 5

Gustavus Adolphus College 7

Illinois Central College 8

FORUM Update 9

Additional Programs 11

Resources 12

The *Forum for Liberal Education* is a topic-oriented publication featuring a subject of importance for liberal education in each issue. It does not endorse or evaluate institutional activity. Rather, it describes the various ways in which institutions of higher education address important common concerns.

New Approaches to General Education

General education is one of the topics for higher education in 1978. The discussions at Harvard have attracted the attention of the media nationwide; other colleges and universities are asking the same questions at a more local level. Almost every campus, it seems, has a committee studying the general education requirements for its students.

This issue of the Forum for Liberal Education *is designed to assist institutions in the process by providing examples of general education programs on six different campuses. The philosophies and approaches vary widely, from college-wide competency requirements to optional thematic clusters, from Piagetian programs for poorly prepared students to better integration of science concepts in required courses. Each institution has tried to achieve broad general education goals through a mechanism appropriate to its own students and faculty.*

This issue also contains a list of additional general education programs and a set of other resources. In addition, it provides an update on the progress of some of the specific projects described in the October 1977 issue of Forum *on core curriculum. Finally, and most importantly, Theodore D. Lockwood reminds us all to ask the right questions about general education, beginning with the most basic one: "What does it mean to be liberally educated?"*

See DOORS Article

Reprinted

On Reverse Side

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